REMARKS

This Amendment is being refiled to re-present the changes to pages 18 and 45 in response to a Notice under 37 C.F.R. 1.121.

This is to acknowledge that Claims 24-31 and 35-40 were allowed in the above-identified Office Action, and that Claim 50 was merely objected to. By this response, Applicants have cancelled rejected Claims 1-23, while amending Claims 32, 41-48, and 50, so that all of the remaining claims are believed to be in condition for allowance.

Referring again to the Office Action, and particularly to the numbered paragraphs thereof, Applicants' comments are as follows:

In response to paragraphs 1 and 2, Applicants have submitted a form of the Abstract which is set forth as a single paragraph.

The spelling error pointed out in paragraph 3, with regard to Claim 50 has been corrected.

With respect to the drawings, as referred to in paragraphs 4-10, Applicants have submitted a separate drawing amendment, and upon receiving an acceptance of that drawing amendment from the Examiner, corrected drawings will be prepared and filed.

Specifically, with reference to paragraphs 4 and 5 of the Office Action, reference numeral "1" in Fig. 1A has been changed to "201", and the reference numerals in Fig. 2 have been deleted.

In response to the Examiner's inquiry as set forth in paragraph 6 of the Office Action, this is to note that Applicants' proposed Drawing Amendment has changed Figs. 1D and 1E to include reference numeral "4".

Paragraph 7 of the Office Action refers to the phrase "liquid flow path structure member 4" at lines 9-10 of Page 27 of the Specification. That phrase on page 27

has been changed as a result of the foregoing Amendment to read --liquid flow path in structure member 4--.

In paragraph 8 of the Office Action it was pointed out that reference numeral "209" was not used in Figs. 1A through 1E of the Drawing, although that reference numeral is referred to in the Specification regarding those drawing figures. Accordingly, the accompanying proposed Drawing Amendment has added reference numeral "209" to each of Figs. 1D and 1E.

In paragraph 9 of the Office Action an objection is noted wherein the "water repellant layer 5" is referred to on page 45, lines 24 and 25 as "the ink repellant layer 5". This quoted phrase has now been amended to read --the water repellant layer 5 which also repels ink,--.

Paragraph 10 of the Office Action points out that the reference numeral "7" is used for one element on pages 26 and 27 of the Specification, and for an element described differently o page 45. To remedy this apparent discrepancy, the numeral "7" has been deleted from page 45.

The objection to Claim 15 as set forth in paragraph 11 is now moot because Claim 15 has been cancelled. Similarly, the problem raised in paragraph 13 is now moot because Claims 9-11 have been cancelled. Further in this regard, however, the Examiner noted that the same problem exists with respect to Claims 32-34 in that the formula set forth in Claim 32 appeared to be in error. In this regard, Applicants have amended Claim 32 to change the last expression in the claim, namely, "$CCCH_3$" to read --$C(O)CH_3$--.

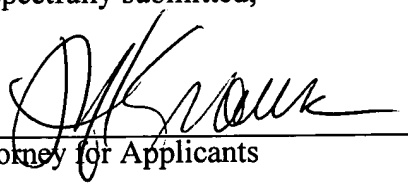
Applicants have remedied the objection set forth in paragraph 14 of the Office Action by cancelling Claims 18-22 and deleting the word "first" from each of Claims 41-45. As recognized by the Examiner in paragraph 15, Claim 46 should have been dependent on Claim 24, and pursuant to paragraph 17 of the Office Action Claim 47 has also been amended to depend frm Claim 24.

Finally, the claims which were rejected in view of the prior art have all been cancelled.

For all these reasons Applicants believe that the application is now in condition for allowance, wherefore the issuance of a formal Notice of Allowance is solicited.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address given below.

Respectfully submitted,



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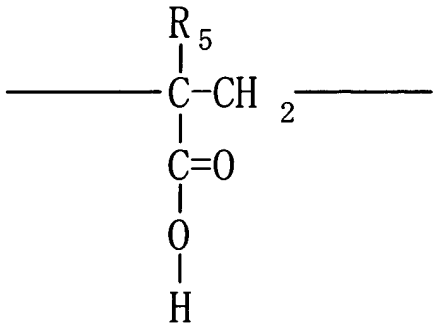
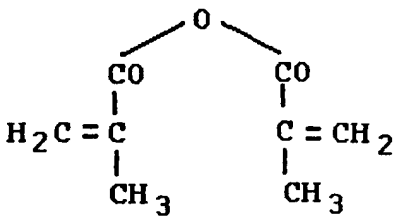
general formula 3

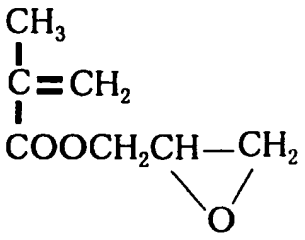


In the general formula 3, R_5 represents a hydrogen atom or an alkyl group with 1 to 3 carbon atoms.

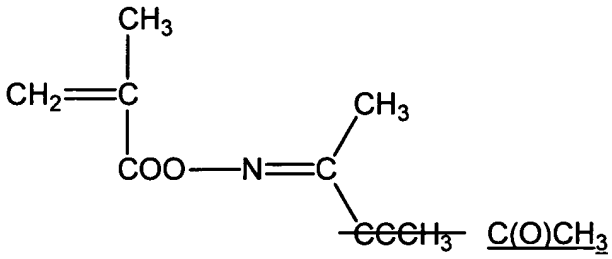
As a factor for expanding the sensitivity region, there can be selectively employed a structure having a function of expanding the photosensitive wavelength region, and there can be advantageously utilized a monomer unit obtained by copolymerizing a monomer capable of expanding the sensitivity region toward a longer wavelength side as represented by following formulas (2) to (6):



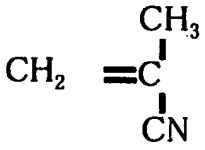
(2)



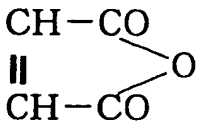
(3)



(4)



(5)



(6)

A composition ratio of such monomer unit as a factor for expanding the sensitivity region in the copolymer is preferably 5 to 30 wt.% with respect to the entire copolymer.

In case the factor for expanding the sensitivity region is methacrylic anhydride, it is preferred that the ternary copolymer includes

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201.

For such resin 7, there can be employed a resin such as cyclized isoprene that can protect the materials from etching and can be easily removed after the etching.

Then, after the removal of the covering resin 7 by dissolution, the mold pattern 3 is irradiated, as shown in Fig. 1E, by an ionizing radiation of a wavelength of 300 nm or less across the liquid flow path in structure member 4 constituted of a hardened portion by the pattern exposure to the negative-working photosensitive material layer. Such irradiation intends to decompose the crosslinked positive-working resist constituting the mold pattern 3 to a lower molecular weight, thereby enabling easy removal thereof.

Finally, the mold pattern 3 is removed by a solvent. In this manner there is formed a liquid flow path 10 including a discharge chamber.

The above-described steps can be applied to prepare the liquid discharge head of the present invention.

As the producing method of the present invention can be executed by a solvent coating method such as a spin coating method utilized in the semiconductor manufacturing technology, the liquid flow path can be formed with an extremely precise and

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A-187 (Nihon Unicar Inc.) 4 parts by weight

SP-170 (Asahi Denka Industries Co.) 2 parts by weight

Diethylene glycol monoethyl ether 100 parts by weight

Then the liquid flow path structure material 207 and the ink repellent layer were patterned by a pattern exposure by MPA-600 (manufactured by Canon Inc.) with a light of a wavelength of 290 to 400 nm and with an exposure amount of 400 mJ/cm^2, then a post-exposure bake for 120 seconds at 120°C on a hot plate and a development with methyl isobutyl ketone to form an ink discharge port 209. In the present embodiment, there was formed a discharge port pattern of a diameter of 10 μm.

Then, on the rear surface of the processed substrate, an etching mask [[7]] having an aperture of a width of 1 mm and a length of 10 mm was prepared with a polyetheramide composition (HIMAL, manufactured by Hitachi Chemical Co.). Then the substrate was subjected to an anisotropic etching by immersion in a 22 wt.% TMAH aqueous solution maintained at 80°C, thereby forming an ink supply aperture 210. In this operation, in order to protect the [[ink]] water repellent layer 5 (which also repels ink) from the etching solution, the anisotropic etching was conducted after coating a protective film (OBC manufactured by Tokyo Oka Industries Co.; not

shown) on the ink repellent layer.

Then, after the OBC employed as the protective film was removed by dissolution with xylene, a flush exposure was executed with the light of a wavelength of 200 to 280 nm and with an exposure amount of 80,000 mJ/cm^2 through the nozzle constituting member and the ink repellent layer, thereby solubilizing the flow path pattern 203. Subsequently the substrate was immersed in methyl lactate under an application of ultrasonic vibration to remove the flow path pattern, whereby an ink jet head was prepared. The polyethylamide resin composition, employed as the etching mask was removed by dry etching with oxygen plasma.

The ink jet head thus prepared was mounted on a printer and subjected to an evaluation of discharge and recording, in which a satisfactory image recording was possible.

(Embodiment 7)

An ink jet head was prepared in the same manner as in the embodiment 6 except that a following photodegradable positive-working resist was employed, and was subjected to an evaluation of discharge and recording, in which a satisfactory image recording was possible:

* A methacrylic anhydride/methyl methacrylate radical copolymer (monomer composition molar ratio 10/90);

weight-averaged molecular weight (Mw: converted